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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/538,380	06/13/2005	Toshinobu Nakata	81844.0037	5063

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EXAMINER	
MOWLA, GOLAM	
ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
11/21/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/538,380	NAKATA ET AL.	
	Examiner	Art Unit	
	GOLAM MOWLA	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 August 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/25/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment of 08/13/2008 does not place the Application in condition for allowance.

2. Claims 1, 2 and 4-9 are pending. Applicant has amended claims 1 and 7, and cancelled claim 3.

Status of the Rejections

3. Due to Applicant's amendment of claim 1, all rejections from the office Action mailed on 05/14/2008 are withdrawn. New ground(s) of rejection under 35 U.S.C. 103 is presented below.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claim 1-2 and 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kishi et al. (US 4795500, listed in IDS).

As to claim 1, Kishi discloses a transparent thin-film solar-cell module (transparent photovoltaic device, see abstract) comprising:

- a multilayer film comprising a first electrode layer (front electrode 3, figs. 1-6; Col. 2, line 40 - Col. 3, line 9), a semiconductor layer (photoactive semiconductor layer 4, figs. 1-6; Col. 2, line 40 - Col. 3, line 9), and a second electrode layer (back electrode 5, figs. 1-6; Col. 2, line 40 - Col. 3, line 9) stacked in that order on a main surface of a transparent insulating

substrate (transparent insulating substrate 1, figs. 1-6; Col. 2, line 40 - Col. 3, line 9);

- a cell region comprising a plurality of photoelectric conversion cells connected in series (photoelectric conversion elements 2 shown in the drawing as a congregation of a plurality of elements by means of being connected in series, see figs. 1-6); and
- a plurality of light-transmissive aperture holes (hole 6, see figs. 1-6) in the cell region, the plurality of light-transmissive aperture holes being formed along lines arranged at intervals in a range (see fig. 2, 5, 6, 7 and 9) and each crossing said calls connected in series (see fig. 5) by removing at least the second electrode (5) layer and the semiconductor layer (4) (see fig. 3 and 6 and col. 2, line 63 to col. 3, line 9; col. 3, lines 33-37), the light-transmissive aperture holes (6) each having a diameter of 100 μm (0.1 mm; Col. 2, lines 67-68), the plurality of light-transmissive aperture holes being disposed in a line (see fig. 6 in which the holes 6 are disposed in a line) at a distance D (distance D, fig 9) between the centers of the light-transmissive aperture holes.

Claim 1 recites the limitation "the plurality of light-transmissive aperture holes being formed by removing at least the second electrode layer and the semiconductor layer with irradiation of laser light." However, this limitation has not been given any patentable weight, because this is a product-by-process limitation. Therefore, the determination of patentability is based on the product, and not on the method (such as

irradiation of laser light to form aperture) of making the product. See MPEP 2113 [R-1] Product-by-Process Claims. See also *In re Thorpe*, 777F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Although Kishi discloses that the plurality of light-transmissive aperture holes being formed along lines arranged at intervals in a range as shown in fig. 2 or 7 or 9, Kishi is silent as to whether the range is 0.5 mm to 3 mm.

One of ordinary skill in the art realizes that the arrangement of lines at an optimum allows for optimum light-transmissive aperture holes which would increase the photovoltaic conversion efficiency by transmitting more light and therefore converting it to electricity. In addition, one of ordinary skill in the art realizes that such a ranged distance to dispose the lines can be obtained by routine experimentation. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation" - MPEP § 2144.05. Hence, it would have been obvious to one of ordinary skill in the art to have determined the optimum range by routine experimentation to dispose the lines containing the light-transmissive aperture holes.

Kishi is silent as to whether the distance D, as shown in figure 9, between the centers of the light-transmissive aperture holes of 1.01 to 2 times the diameter of each light-transmissive aperture holes.

However, it is well known in the solar-cell art to utilize a large number of aperture holes in order to increase the transmission of light as shown by Kishi (Col. 3, lines 10-14). In addition, one of ordinary skill in the art realizes that such a ranged distance to

dispose the aperture holes can be obtained by routine experimentation. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation" - MPEP § 2144.05. Hence, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to determine the optimum distance by routine experimentation for disposing the aperture holes, because it allows for a large number of aperture holes, and thus increases the transmission of light, as desired by Kishi.

As to claim 2, Kishi further discloses that the light-transmissive aperture holes are disposed in a straight line (see fig. 5).

Kishi is silent as to whether the holes are disposed at intervals of 1.01 to 1.5 times the diameter of the hole.

However, it is well known in the solar-cell art to dispose the holes as closely as possible to provide a large number of aperture holes to increase the transmission of light as shown by Kishi (Col. 3, lines 10-14). In addition, one of ordinary skill in the art realizes that such an interval range to dispose the aperture holes can be obtained by routine experimentation. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation" - MPEP § 2144.05. Hence, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to determine the optimum interval distance by routine experimentation for disposing the aperture holes, because it allows for an increased transmission of light by disposing the holes as close as possible to provide for a large number of aperture holes, as desired by Kishi.

As to claim 4, Kishi further discloses that the area ratio of the total area of the light-transmissive aperture holes to the area of the cell region is 5% to 30% (Col. 3, lines 5-9).

As to claims 5 and 6, Kishi further discloses that the light-transmissive aperture holes are disposed in a line parallel to the series-connection direction of the photoelectric conversion cells, and to each other at regular intervals (as shown in fig. 5, the holes 6 are disposed in line parallel to the connection direction of the cells, and the lines are parallel to each other at regular intervals).

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kishi as applied to claim 1, and further in view of Psyk et al. (US 6274804, cited in previous office action).

Kishi discloses a transparent thin-film solar-cell module as discussed above for claim 1. Kishi further discloses that the module comprises a back sealer (back surface 7, fig. 1, Col. 3, lines 14-18). Kishi also discloses that the back sealer is composed of EVA or epoxy or acrylic resin.

Kishi is silent as to whether the back sealer comprises glass or fluorocarbon resin.

It is well known in the solar-cell art to utilize fluorocarbon or glass as the back sealer. Psyk discloses a solar cell module (see title, abstract, and fig. 11) wherein back sealer is composed of glass (Col. 3, lines 28-36). Psyk uses glass wafer as the back sealer because such use of glass as the back sealer is conventional in the art as it

allows for transmission of light from the back surface as well, in addition to transmission of light from the front surface.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the glass wafer of Psyk in the solar-cell module of Kishi, because such is conventional in the art as it allows for transmission of light from the back surface as well (besides front surface).

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kishi as applied to claim 1, and further in view of Yamaguchi et al. (US 4773943, cited in previous office action).

Kishi discloses a method of making a transparent thin-film solar-cell module as discussed above for claim 1.

Kishi is silent as to whether the light-transmissive aperture holes are formed by irradiating the multilayer film with laser light, wherein the distance between the centers of adjacent light-transmissive aperture holes disposed in a straight line is determined by the frequency of Q-switching of the laser light and a relative scanning velocity between the transparent insulating substrate and the laser light.

Yamaguchi discloses a method for producing a solar cell module (photovoltaic device, see title and abstract) wherein the light-transmissive aperture holes (51, fig. 10) are formed by irradiating the multilayer film with laser light (Col. 11, lines 13-20), wherein the distance between the centers of adjacent light-transmissive aperture holes disposed in a straight line (see fig. 10 for disposing of holes 51 in a horizontal straight line) is determined by the frequency of Q-switching of the laser light and a relative

scanning velocity between the transparent insulating substrate and the laser light (Col. 11, lines 13-20). Yamaguchi uses laser light irradiation to from light-transmissive aperture holes because it allows for a solar cell module with a larger light-receiving area on the insulative substrate having predetermined size and higher output. Yamaguchi further uses Q-switching frequency and relative scanning velocity to dispose the aperture holes in a straight line because it allows for a solar cell module with a larger light-receiving area on the insulative substrate having predetermined size and higher output (Col 4, line 66 – Col. 5, line 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the laser irradiation and Q-switching frequency and relative scanning velocity methods of Yamaguchi in the solar cell module of Kishi to form aperture holes and to dispose the aperture holes in a straight line, respectively, because such methods are conventional in art as it allows for forming a solar cell module with a larger light-receiving area on the insulative substrate having predetermined size and higher output, as taught by Yamaguchi.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kishi in view of Yamaguchi as applied to claim 8, and further in view of Nostrand et al. (US 4166918, cited in previous office action).

Kishi in view of Yamaguchi discloses a method for making a transparent thin-film solar-cell module as discussed above for claim 8. Neither Kishi nor Yamaguchi explicitly disclose whether the method comprises performing reverse-bias treatment after forming the light-transmissive aperture holes.

However, it is well known in the solar-cell art to apply reverse-bias to burn out electrical shorts and shunts during the fabrication of the solar cell as taught by Nostrand (see abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to perform the reverse-bias technique of Nostrand in the method of Kishi, because such technique is conventional in the solar-cell art to burn out electrical shorts and shunts, as taught by Nostrand.

Response to Arguments

9. Applicant's arguments with respect to claims 1, 2 and 4-9 have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues that “the applied reference fails to disclose or suggest "along lines arranged at intervals in a range of 0.5 mm to 3 mm and each crossing said cells connected in series by removing at least the second electrode layer and the semiconductor layer with irradiation of laser light, the light-transmissive aperture holes each having a diameter in a range of 30 μm to 500 μm," as required by amended independent Claim 1 of the present invention” (see Remarks, page 3).

Although Kishi does not explicitly discloses the light transmissive aperture holes being formed along lines arranged at intervals in a range of 0.5 mm to 3 mm, one of ordinary skill in the art realizes that the arrangement of lines at an optimum allows for optimum light-transmissive aperture holes which would increase the photovoltaic conversion efficiency by transmitting more light and therefore converting it to electricity. In addition, one of ordinary skill in the art realizes that such a ranged distance to dispose the lines can be obtained by routine experimentation. “Where the general

conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation" - MPEP § 2144.05. Hence, it would have been obvious to one of ordinary skill in the art to have determined the optimum range by routine experimentation to dispose the lines containing the light-transmissive aperture holes

Applicant also argues that "while holes 6 of Kishi are formed by etching (See, Kishi, Col. 2, lines 63-65), the aperture holes of the present invention are formed by laser irradiation" (see Remarks, pages 3-4).

Examiner notes that the limitation "the plurality of light-transmissive aperture holes being formed by irradiation of laser light" has not been given any patentable weight, because this is a product-by-process limitation. Therefore, the determination of patentability is based on the product, and not on the method (such as irradiation of laser light to form aperture holes) of making the product. See MPEP 2113 [R-1] Product-by-Process Claims. See also *In re Thorpe*, 777F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence/Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GOLAM MOWLA whose telephone number is (571) 270-5268. The examiner can normally be reached on M-F, 0900-1700 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, ALEXA NECKEL can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/G. M./
Examiner, Art Unit 1795

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795